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ORIGINAL ARTICLE

Evaluation of two hemorrhoidectomy techniques: Harmonic scalpel and Ferguson's with electrocautery

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Summary *Aim:* The prevalence of symptomatic hemorrhoidal disease is a common disease that usually needs surgery for treatment. Although conservative treatment is often enough for early stages, late stage disease usually needs surgical treatment. The most common and effective approaches used for conventional surgical treatment are harmonic scalpel (HS) and Ferguson's with electrocautery hemorrhoidectomy (FEH). We aimed to use the HS device for hemorrhoidectomy in Grade III and Grade IV hemorrhoids and compare our results with FEH. *Materials and methods:* Enrolled into the study were 151 patients who were operated for symptomatic Grade III–IV hemorrhoids. Patients were randomized into FEH and HS groups. The present review focused on comparing HS hemorrhoidectomy versus FEH with regards to operating time, postoperative pain, duration of disease, number of issued analgesics, length of hospital stay, time to return to normal activity, and postoperative complications.

Results: The mean ages of patients who underwent HS and FEH were 34.1 ± 9.2 years and 33.7 ± 8.4 years, respectively. The average postoperative stay in the HS group was 1.0 ± 0.1 days and in the FEH group was 1.2 ± 0.4 ($p = 0.001$). The time of return to normal activity was less for the HS groups than for the FEH groups (10.6 ± 2.1 days vs. 16.0 ± 6.3 days; $p = 0.001$). The mean operating time of the HS and FEH groups was 16.8 ± 4.1 minutes and 25.5 ± 7.7 minutes, respectively ($p = 0.001$). The total analgesic doses for the HS group were 790 ± 206 mg, 619 ± 234 mg, and 30 ± 99 mg, and for the FEH group were 1096 ± 194 mg, 1000 ± 259 mg, and 40 ± 0 mg for postoperative Day 1, Day 7, and Day 28, respectively. There was no significant difference between the HS group and the FEH group in the terms of the number of excised hemorrhoid masses (2.0 ± 0.6 vs. 1.88 ± 0.6).

Conflicts of interest: The authors declare that they have no financial or non-financial conflicts of interest related to the subject matter or materials discussed in this article.

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Conclusion: HS hemorrhoidectomy is safe and effective, causes less blood loss and postoperative pain, and fewer complications compared to FEH.

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1. Introduction

The prevalence of symptomatic hemorrhoidal disease in the population aged >40 years is approximately 58%. This is a common disease that usually needs surgery for treatment. Although conservative treatment is often sufficient for early stages (Grade I and Grade II), late stage disease (Grade III and Grade IV) usually needs surgical treatment. The most common and effective approaches used for conventional surgical treatment are Milligan–Morgan (open) and Ferguson's with electrocautery hemorrhoidectomy (FEH; closed).^{1,2} However, FEH can cause complications including pain, postoperative bleeding, urinary retention, anal stenosis, and anal incontinence.² The modified electrosurgical harmonic scalpel (HS) instrument is an alternative technique for hemorrhoidectomy that has been developed recently.³ HS is a device that simultaneously cuts and coagulates tissues by producing a vibration of 55.5 kHz. When compared with conventional electrosurgical devices, this ultrasonic cutting and coagulating device has advantages such as causing minimal lateral tissue injury (the HS causes lateral thermal injury 1–3 mm wide, approximately half that caused by bipolar systems), less fumes, not making neuromuscular simulation, and more localized impact.^{3,4} We used the HS device for hemorrhoidectomy in Grade III and Grade IV hemorrhoids and compared our results with those for FEH.

2. Materials and methods

Enrolled into the study were 151 patients who were operated for symptomatic Grade III and Grade IV hemorrhoids in Keçiören Research and Education Hospital, General Surgery Department between May 2009 and June 2011. Patients were randomized into FEH and HS groups. Patients with liver cirrhosis, HIV infection, uncontrolled diabetes, or a bleeding diathesis were excluded from the study. Patients on anticoagulant medication or aspirin were told to stop their medication 7 days prior to surgery.

The present review focused on comparing HS hemorrhoidectomy versus FEH with regards to operating time, postoperative pain, duration of disease, number of issued analgesics, length of hospital stay, time to return to normal activity, and postoperative complications. Bleeding, anal stenosis, urinary retention, and rates of abscess were assessed as postoperative complications.

Patients enrolled in the study were hospitalized on the operation day and enema was performed twice (6 hours and 1 hour) prior to the operation. Patients without complications after the operation were discharged from hospital 1 day after the surgery. Intravenous sedation and caudal blockage was the chosen anesthetic procedure for

all patients. Patients were placed in the lithotomy position. After dilatation of anal canal, situation of hemorrhoids was determined with an anoscope. FEH was defined as transfixation of hemorrhoid pedicle and opposition of mucosal edges of the defect with 3/0 chromic catgut suture. HS was defined as excision of hemorrhoid pedicle to the apex region without damaging the internal sphincter with the help of vascular forceps. Anal spongostan was placed for both patient groups to control bleeding.

Total analgesic (metamizole Na mg/days) needs of the patients were recorded after 1 day, 7 days, and 28 days. Pain was recorded on a visual analogue scale (VAS) on the same days. VAS over 40 was the cutoff level for analgesics. Operation time is defined as the time between the incision and suturing of the skin. Patients were assessed for early and late complication when they came back for follow up.

All data were collected and analyzed using SPSS version 11.5 (SPSS Inc., Chicago, IL, USA). Chi-square test and Student *t* test were performed for comparison of the groups as appropriate. A *p* value <0.05 was considered as statistically significant.

3. Results

The mean age of patients who underwent HS and FEH was 34.1 ± 9.2 years and 33.7 ± 8.4 years, respectively. The male/female ratio of the HS and FEH groups was 46/34 and 41/30, respectively. The average postoperative stay in the HS group was 1.0 ± 0.1 days and in the FEH group was 1.2 ± 0.4 days ($p = 0.001$). The time of return to normal activity was shorter for the HS groups than for the FEH groups (10.6 ± 2.1 days vs. 16.0 ± 6.3 days, respectively; $p = 0.001$; Table 1).

The mean operating time of the HS and FEH groups was 25.5 ± 7.7 minutes and 16.8 ± 4.1 minutes respectively ($p < 0.001$). There was no significant difference between HS and FEH groups in the terms of the number of excised hemorrhoid masses (2.0 ± 0.6 vs. 1.88 ± 0.6 ; $p = 0.26$). The VAS pain scores on postoperative Day 1, Day 7, and Day 28 of the HS group were 0.7 ± 0.6 , 5.4 ± 0.7 , 4.0 ± 0.8 , and 0.01 ± 0.1 , respectively, and of the FEH group were 0.7 ± 0.4 , 6.8 ± 1.8 , 5.2 ± 1.2 , and 1.4 ± 0.2 , respectively ($p = 0.001$). The total analgesic doses of HS hemorrhoidectomy group were 790.6 ± 206.9 mg, 619.3 ± 234.2 mg, and 30.9 ± 99.1 mg for postoperative Day 1, Day 7, and Day 28, respectively ($p = 0.001$, $p = 0.001$, and $p = 0.06$, respectively). The total analgesic doses of the FEH group were 1096.12 ± 194 mg, 1000 ± 259 mg, and 40.1 ± 0 mg on postoperative Day 1, Day 7, and Day 28 respectively ($p = 0.001$, $p = 0.001$, and $p = 0.06$, respectively). VAS scores and analgesic doses were correlated (Table 1).

Table 1 Outcomes of Ferguson's hemorrhoidectomy (closed) versus harmonic scalpel (open) hemorrhoidectomy.

	FEHG (n = 71)	HSHG (n = 80)	p
Age	33.7 ± 8.4	34.1 ± 9.2	0.91
Mean hospital stay (d)	1.2 ± 0.4	1.0 ± 0.1	0.001
Time to start of normal activity (d)	16.0 ± 6.3	10.6 ± 2.1	0.001
Operation times (min)	25.5 ± 7.7	16.8 ± 4.1	0.001
Postoperative hemorrhage	4.2	2	0.10
Urinary retention	28.2	16.3	0.05
Anal abscess	1.4	—	0.47
Anal stenosis	1.4	—	0.47
Anal incontinence	1.4	—	0.47
Recurrence	6	5	0.14
VAS 24 h postoperative	6.8 ± 1.8	5.4 ± 0.7	0.001
VAS 7 d postoperative	5.2 ± 1.2	4.0 ± 0.8	0.001
VAS 28 d postoperative	1.4 ± 0.2	0.01 ± 0.1	0.001
Need for total postoperative analgesic at 24 h (mg)	1096.12 ± 194	790.6 ± 206.9	0.001
Need for total postoperative analgesic at 7 d (mg)	1000 ± 259	619.3 ± 234.2	0.001
Need for total postoperative analgesic at 28 d (mg)	40.1 ± 0	30.9 ± 99.1	0.06

Data are presented as % or mean ± SD.

FEHG = Ferguson's with electrocautery hemorrhoidectomy group; HSHG = harmonic scalpel hemorrhoidectomy group; VAS = visual analog scale.

In the early postoperative period (within 7 days of surgery), the HS group had lower incidence of acute urinary retention after surgery than the FEH group (16.3% vs. 28.2%; $p = 0.05$). The incidence of major postoperative hemorrhage was low and comparable in each treatment group as shown in Table 1 (HS, 2% vs. FEH, 4.2%; $p = 0.10$). Rate of abscesses, stenosis, and incontinence of patients who had FEH was 1.4% while no abscesses, stenosis, or incontinence were seen in the HS group. After 12 months, the recurrence rate for FEH was 6%, while recurrence rate for HS group was 5% ($p = 0.14$; Table 1).

4. Discussion

Conventional hemorrhoidectomy, including open and closed methods, is accepted as the gold standard for surgical treatment of hemorrhoids worldwide. Conventional hemorrhoidectomy for Grade III and Grade IV hemorrhoids is a tedious procedure associated with significant morbidity and a prolonged convalescence.⁵

HS, which can be used for cutting and coagulation simultaneously, does not transfer the neuromuscular current and makes minimal (1–3 mm) lateral thermal effect, which is why the instrument is used widely.² After ultrasonic cutting and coagulation, the HS technique gives a signal that allows surgeon to finish the process more quickly. Furthermore, HS causes minimal intraoperative bleeding, which allows the surgeon better exposure, so surgery lasts less time than with other techniques, and causes minimal mucosal damage, leading to faster wound healing, less postoperative morbidity, and minimal pain.²

Electrocautery, as used for conventional FEH, has the disadvantage of damaging the surrounding mucosa and transferring the current. Furthermore it does not achieve sufficient vascular coagulation, leading to longer operation

time and inadequate exposure. The surgeon has to suture deeply in the mucosa to stop the bleeding, causing postoperative pain, anal stenosis, and loss of workforce. In comparison with FEH, HS hemorrhoidectomy has shorter operating time (25.5 ± 7.7 minutes vs. 16.8 ± 4.1 minutes; $p = 0.001$). The mean number of excised hemorrhoidal masses with HS and FEH was 2.0 ± 0.6 and 1.88 ± 0.6, respectively ($p = 0.26$). Postoperative complications, such as hemorrhage (2% vs. 4.2%; $p = 0.10$) and urinary retention (16.3% vs. 28.2%; $p = 0.05$), were all lower in the HS group. The postoperative hospital stay (1.0 ± 0.1 days vs. 1.2 ± 0.4 days; $p = 0.001$) was also lower in the HS group compared with FEH. Previous study has demonstrated that the incidence of residual hemorrhoids of HS and FEH were 3.5% and 5%, respectively.^{5–7} In our study, ratio of abscess, stenosis, and incontinence were recorded in the FEH group but not in the HS group. At 12 months' follow-up, there was no significant difference in terms of recurrence between HS and FEH (5% vs. 6%; $p = 0.14$). Although no difference was determined, longer follow-up and more patient series are needed.⁸

As stated in previous randomized studies, postoperative pain is felt at the highest level in the first 24 hours and decreases later.⁸ In our study not only early but also late postoperative pain was determined by VAS. The VAS pain scores at Day 0, Day 7, and Day 28 were lower in HS group than FEH group because HS can be used for cutting and coagulation simultaneously. According to these data, total analgesic need was the highest in first 24 hours and then decreased gradually, and was lower in HS group than FEH group at postoperative Day 0, Day 7, and Day 28.^{8,9} As reported previously, postoperative morbidity delays the wound healing period and return to work. The period for returning to work for patients who received FEH may be 2–3 weeks. Mean time of return to normal activity was shorter for the HS groups than for the

FEH groups (10.6 ± 2.1 days vs. 16.0 ± 6.3 days; $p = 0.001$).¹⁰

In conclusion, HS hemorrhoidectomy is preferred for surgical treatment of Grade III or Grade IV hemorrhoids. It is safe and effective, and causes less blood loss, post-operative pain, and complications compared to FEH.

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